RHODORA, Vol. 101, No. 906, pp. 200–205, 1999

NEW ENGLAND NOTE

RARE AND NON-NATIVE PLANTS OF MASSACHUSETTS' FLOODPLAIN FORESTS

JENNIFER B. KEARSLEY

Massachusetts Natural Heritage & Endangered Species Program,
Massachusetts Division of Fisheries & Wildlife, Route 135,
Westborough, MA 01581

Six rare plant species occur primarily in floodplain forest communities in Massachusetts: *Arisaema dracontium, Betula nigra, Carex grayi, C. typhina, Mimulus alatus,* and *Rumex verticillatus.* Two of the species, *M. alatus* and *B. nigra,* are identified as regionally rare taxa (Division 2) on the *Flora Conservanda:* New England list (Brumback and Mehrhoff, et al. 1996), and all except *B. nigra* are protected species under the Massachusetts Endangered Species Act (Massachusetts Division of Fisheries and Wildlife 1997). In a statewide inventory and vegetation classification of Massachusetts' floodplain forest communities (Kearsley 1999), all six rare plant species were found to occur primarily in two of six identified community types: Transitional floodplain forests—*Acer saccharinum–Arisaema dracontium* association (Type III) and Small-river floodplain forests—*A. saccharinum–Fraxinus pennsylvanica–Quercus palustris* association (Type IV). Floodplain forest communities of Types III and IV appear to be less severely scoured and more poorly drained than Major-river types (Types I and II), but more well-drained than seasonally flooded *A. rubrum* Alluvial swamp forests (Type V).

In the Massachusetts floodplain forest inventory, *Arisaema dracontium* occurred primarily in floodplain forests classified as Type III. All current floodplain forest localities of *A. dracontium* are limited to the Connecticut, Deerfield, and Housatonic Rivers. Eleven of the thirty sites examined in the inventory and classification project that occur on the Connecticut, Deerfield, or Housatonic Rivers had vegetation classified as Type III, and *A. dracontium* occurred at six of those sites. All plots classified as Type III in the TWINSPAN analysis were clustered together with and without *A. dracontium* included in the analysis.

Arisaema dracontium did not occur at the nineteen sites on the Connecticut, Deerfield, and Housatonic Rivers with vegetation

not classified as Type III, with the exception of one site on the Mill River in Northampton classified as a Small-river floodplain forest (Type IV). In addition to the six *A. dracontium* localities surveyed in 1997, six other current localities of *A. dracontium* are tracked in the Massachusetts Natural Heritage and Endangered Species Program (MNHESP) Biological and Conservation Database. These six sites were not included in the floodplain forest inventory because they are small and/or disturbed floodplain forest patches, but the associated species (*Acer saccharinum, Fraxinus pennsylvanica,* and *Ulmus americana* over a mixed herbaceous understory of *Boehmeria cylindrica, Laportea canadensis, Pilea pumila, Onoclea sensibilis,* and *Matteuccia struthiopteris*) closely match the species association of Type III floodplain forest communities.

The results of the floodplain forest inventory support Sanders' (1989) earlier findings that *Arisaema dracontium* populations occurred on Limerick and Hadley silt loams, but not on adjacent Winooski silt loams or Suncook loamy, fine sands along the Connecticut River. They also suggest that efforts aimed at locating and protecting *A. dracontium* populations should focus on Transitional floodplain forest communities (Type III).

Carex grayi, C. typhina, Mimulus alatus, and *Rumex verticillatus* were all found to occur primarily in floodplain forest sites classified as Type IV, which are characterized by a mixture of *Acer saccharinum, Fraxinus pennsylvanica,* and *Quercus palustris* over an open understory dominated by *Onoclea sensibilis* and *Boehmeria cylindrica* (Kearsley 1999). Sorrie (1987) previously described *C. grayi* as occurring in *F. pennsylvanica–A. saccharinum–Q. palustris–Populus deltoides* floodplain forests of the Connecticut and Housatonic Rivers. Of the twelve sites with vegetation classified as Small-river floodplain forests (Type IV; Kearsley 1999), four are current localities of *C. typhina,* two of the four sites are also localities for *C. grayi* and *M. alatus,* and one of the four provides habitat for all four rare plant species. Floodplain forest sites with vegetation not classified as Type IV generally did not contain these four rare plant species, with the following exceptions: two Transitional floodplain forest communities (Type III) on the lower Sawmill River in Montague and on the lower Housatonic River in Sheffield, which are current localities for *C. typhina* and *C. grayi,* respectively, one Alluvial terrace forest—*A. rubrum–Carya ovata–Prunus serotina* associ-

ation (Type VI) on the Nashua River, which is a current locality for *C. typhina,* and the wet borders of a floodplain forest mosaic classified as both Types II and III on the Connecticut River in Longmeadow, Massachusetts, which is a current locality of *R. verticillatus.*

Current rare plant records compiled by MNHESP indicate that *Carex grayi, C. typhina, Mimulus alatus,* and *Rumex verticillatus* also occur in other floodplain communities not included in the recent inventory. These data provide further information about the habitat preferences of these species. *Carex grayi* occurs at five sites not included in the floodplain forest inventory—three sites are small patches of floodplain forest with vegetation associations that are most similar to Types III and IV, and two sites (on the Connecticut and Housatonic Rivers) have vegetation associations most similar to Alluvial terrace forests (Type VI), indicating that *C. grayi* may be found in all three floodplain forest habitats (Types III, IV, and VI). *Carex typhina* is found at one disturbed floodplain forest site not included in the inventory, but with vegetation most similar to Types III and IV. All current localities of *C. typhina* appear to be limited to Types III, IV, and V with most occurring in Type IV forests (five of nine current localities).

Mimulus alatus is known from two localities not included in the floodplain forest inventory, both are at the edges of small tributary creeks along the Connecticut River. The vegetation at these sites is most similar to that of Type IV Small-river floodplain forests, and *M. alatus* appears to be limited to low-energy stream bottoms of the Connecticut River Valley. *Rumex verticillatus* was found at two floodplain forest sites included in the current inventory: one at the border of a meander scar pool in a Small-river floodplain forest (Type IV) and one in the open, seasonally flooded borders of a large floodplain forest mosaic classified both as Major-river floodplain forest (Type II) and as Transitional floodplain forest (Type III) in depressions. *Rumex verticillatus* is known from two other localities in the state, a vernal pool complex and an emergent marsh, indicating that *R. verticillatus* is not strictly associated with a particular floodplain forest community, but rather with seasonally or semi-permanently inundated wetlands that can be associated with floodplain forests.

Betula nigra, which is a primarily southern tree, has a disjunct population in the Merrimack River Valley of southeastern New

Hampshire and northeastern Massachusetts (Burns and Honkala 1990). In Massachusetts, *B. nigra* is limited to sites on the Concord, Shawsheen, and Merrimack Rivers where it occurs as a riverbank tree in a narrow band along the Merrimack River, as an occasional associate within Alluvial swamp forests (Type V) or as the dominant tree in Small-river floodplain forests (Type IV; Kearsley 1999). In areas along the Shawsheen River in Essex County that appear to have been cleared, *B. nigra* occurred in dense thickets (10–30 cm diameter at breast height) over a subcanopy of *Acer saccharinum* saplings, suggesting that *B. nigra* may be replaced by *A. saccharinum.*

Of the 214 species identified in floodplain forest communities during the 1997 inventory (Kearsley 1999), 36, or 17%, were non-native. The most frequently encountered non-native plant species across all types were *Rhamnus frangula, Rosa multiflora, Celastrus orbiculata, Alliaria petiolata, Glechoma hederacea, Lysimachia nummularia, Lythrum salicaria, Myosotis scorpioides,* and *Polygonum cuspidatum.* There were clear distributional patterns of non-native plant species across Massachusetts' floodplain forest communities. *Alliaria petiolata, G. hederacea,* and *P. cuspidatum* were more prevalent on coarse-textured alluvial soils of Major-river floodplain forests (Types I and II). *Polygonum cuspidatum* was most often found on open, heavily-scoured banks, but it also occurred in dense monocultures in open areas within the interior forest. Preventing further canopy openings may be the only effective way to prevent the spread of *P. cuspidatum* in Major-river floodplain forests (Beerling et al. 1994). *Alliaria petiolata* and *G. hederacea* were found mainly along trails and did not appear to be spreading where the natural understory vegetation was intact. These two species were also the two most common exotic plant species in a study of the Potomac River floodplain forests in Virginia and Maryland (Pyle 1995).

Rhamnus frangula, Celastrus orbiculata, Lysimachia nummularia, Myosotis scorpioides, and *Lythrum salicaria* were more common on poorly-drained silt loams in the eastern part of Massachusetts (Types IV, V, and VI; Kearsley 1999). *Lysimachia nummularia, M. scorpioides,* and *R. frangula* covered broad areas at some sites. In two permanent plots monitored by the Massachusetts Audubon Society along the Ipswich River, the cover of *L. nummularia, R. frangula, L. salicaria,* and *M. scorpioides* increased by 50% and 83%, respectively over a six year period

(Anderson 1993). More studies are needed to monitor the spread of these taxa.

Although *Lythrum salicaria* is one of the most invasive wetland plants in the Northeast (Stein and Flack 1996), *L. salicaria* is largely absent from floodplain forest communities in Massachusetts. It occurred only along the wettest riverbanks in eastern Massachusetts and on sandy beaches on the Connecticut River. *Catalpa speciosa* has been reported to be increasing in abundance in at least one Connecticut River floodplain forest (Burk and Prabhu 1988), and we observed the trees in low but consistent numbers in floodplain forests of Types II, III, and IV (Kearsley 1999).

ACKNOWLEDGMENTS. I thank Paul Somers for his critical review of this note. Information on Massachusetts occurrences of state-protected rare species was obtained from the Massachusetts Natural Heritage and Endangered Species Program (MNHESP) Biological and Conservation Database. Multiple people assisted with the floodplain forest community inventory as acknowledged in Kearsley (1999). In particular, I would like to thank Pat Swain, Rebecca Anderson, Henry Woolsey, and the MNHESP staff. The floodplain forest inventory and classification work was in part funded by a State Wetlands Protection Development Grant from the U.S. Environmental Protection Agency.

LITERATURE CITED

ANDERSON, J. 1993. Invasion of the sanctuaries. Sanctuary (publ. of Mass. Audubon Soc.) Jan/Feb: 25.

BEERLING, D. J., J. P. BAILEY, AND A. P. CONOLLY. 1994. *Fallopia japonica* (Houtt.) Ronse Decraene. J. Ecol. 82: 959–979.

BRUMBACK, W. E. AND L. J. MEHRHOFF, in collaboration with R. W. ENSER, S. C. GAWLER, R. G. POPP, P. SOMERS, AND D. D. SPERDUTO, with assistance from W. D. COUNTRYMAN AND C. B. HELLQUIST. 1996. *Flora conservanda*: New England. The New England plant conservation program (NEPCoP) list of plants in need of conservation. Rhodora 98: 233–361.

BURK, C. J. AND V. PRABHU. 1988. Growth and expansion of a naturalized western Massachusetts stand of *Catalpa speciosa* Warder. Rhodora 90: 457–460.

BURNS, R. M. AND B. H. HONKALA, tech. eds. 1990. Silvics of North America: 2. Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.

KEARSLEY, J. 1999. Inventory and vegetation classification of floodplain forest communities in Massachusetts. Rhodora 101:105–135.

MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE. 1997. Massachusetts Endangered Species Act Regulations, 321 CMR 10.60. 114–133.

PYLE, L. L. 1995. Effects of disturbance on herbaceous exotic plant species on the floodplain of the Potomac River. Amer. Midl. Naturalist 134: 244–253.

SANDERS, L. L. 1989. On the occurrence of *Arisaema dracontium* in Hampshire County, Massachusetts. Rhodora 91: 339–341.

SORRIE, B. 1987. Notes on the rare flora of Massachusetts. Rhodora 89: 113–196.

STEIN, B. A. AND S. R. FLACK, eds. 1996. America's Least Wanted: Alien Species Invasions of US Ecosystems. The Nature Conservancy, Arlington, VA.